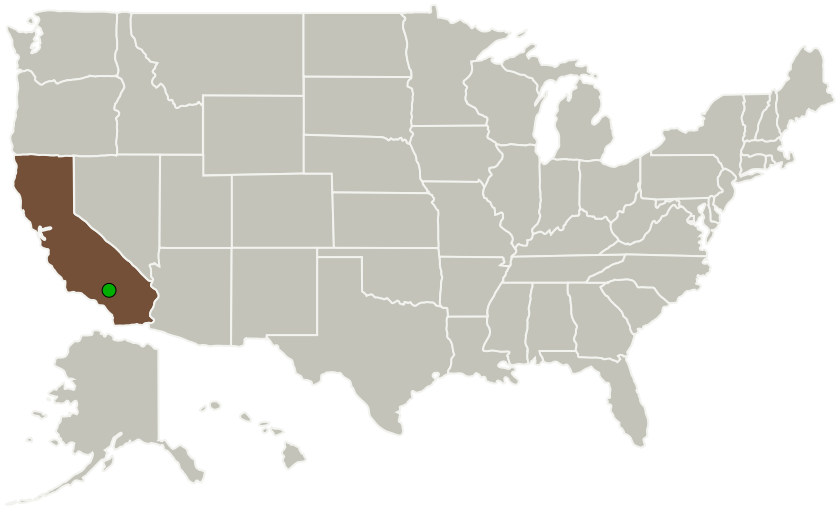
Smart Adaptive Flight Effective Cue (SAFE-Cue), Phase I

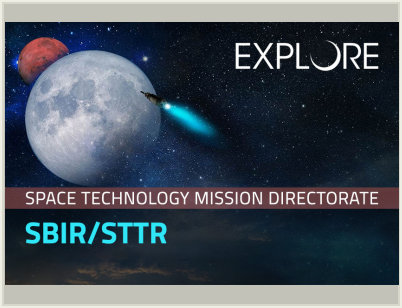
Completed Technology Project (2010 - 2010)

Project Introduction

As a means to enhance aviation safety, numerous adaptive control techniques have been developed to maintain aircraft stability and safety of flight in the presence of failures or damage. The techniques apply a wide array of adaptations from simple gain scheduling to on-line learning algorithms. While the ready availability of low cost, reduced scale UAV systems have allowed for many successful flight test demonstrations, applications to piloted aircraft have been more limited. Flight evaluations of various adaptive control applications conducted by NASA and others have shown great promise. In some cases; however, unfavorable pilot-vehicle interactions including pilot-induced oscillations have occurred. Susceptibility to such interactions is more likely when the pilot interacts with a highly nonlinear vehicle that may no longer have predictable response characteristics. To alleviate these unfavorable interactions, Systems Technology, Inc. (STI) proposes the Smart Adaptive Flight Effective Cue or SAFE-Cue that will provide cues to the pilot via an active control inceptor with corresponding command path gain adjustments. The SAFE-Cue will alert the pilot that the adaptive control system is active and provide guidance through a force feedback cue and command attenuation via a command path gain adjustment as a means to retain pilot-vehicle system stability and performance.

Primary U.S. Work Locations and Key Partners





Smart Adaptive Flight Effective Cue (SAFE-Cue), Phase I

Table of Contents

Smart Adaptive Flight Effective Cue (SAFE-Cue), Phase I

Completed Technology Project (2010 - 2010)

Organizations Performing Work	Role	Type	Location
Systems Technology, Inc	Lead Organization	Industry	
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations
California

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139924)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Systems Technology, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David H Klyde

Co-Investigator:

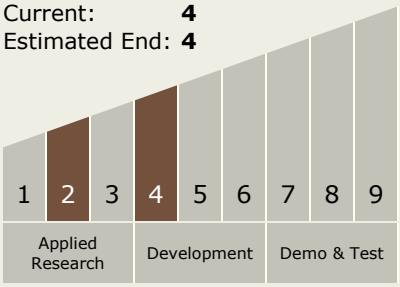
David Klyde

Smart Adaptive Flight Effective Cue (SAFE-Cue), Phase I

Completed Technology Project (2010 - 2010)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.3 Control Technologies
    - TX17.3.1 Onboard Maneuvering / Pointing / Stabilization / Flight Control Algorithms

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System